CONFERENCE PROGRAM

2020 2nd International Applied Mathematics, Modelling and Simulation Conference (AMMS 2020)

June 21-23, 2020

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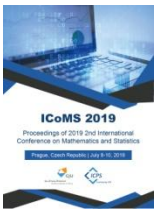
Conference Introduction

2020 2nd International Applied Mathematics, Modelling and Simulation Conference (AMMS 2020) will be jointly held online with 2020 3rd International Conference on Mathematics and Statistics (ICoMS 2020) from **June 21-23, 2020**. This Conference will cover topics on Applied Mathematics, Modelling, Simulation and related fields. It dedicates to providing a platform for exchanging the latest research results and sharing the advanced research methods for researchers, practitioners, and professinals from all over the world.

AMMS is an annually-held conference, which serves to bring experts, scholars and businessmen together to communciate face to face and explore chances for possible cooperation. AMMS 2020 welcomes scholars and researchers working in the field of Applied Mathematics, Modelling and Simulation from all over the world to submit original and not published papers for reviewing of publication and presentation; submit abstract for presentation only or register for participation and listening conference.

Papers will be published in the following proceeding or journal:



Publication in **Conference Proceedings,** which will be indexed by EI Compendex, Scopus, etc.

Publication in **International Journal of Applied Physics and Mathematics (IJAPM) (ISSN: 2010-362X)**, which will be indexed by Index Copernicus, EI (INSPEC, IET), CAS, Google Scholar, EBSCO, etc.

Conference website and email: http://www.amms.org; amms@cbees.net

Presentation Guideline

Presentation Requirement

- At least one author should present for each abstract/full paper during the session.

Time Zone

- The time shown in this program is **Greenwich Mean Time (GMT+02:00)–France Local Time**. Please set up your laptop time in advance.

Equipment Needed

- A computer with an internet connection (wired connection recommended).
- USB plug-in headset with a microphone (recommended for optimal audio quality).
- Webcam (optional): built-in or USB plug-in.

Environment Requirement

- Quiet Location.
- Stable Internet Connection.
- Proper lighting.

Voice Control Rules during the Presentation

- The host will mute all participants while entering the meeting.
- The host will unmute the speakers' microphone when it is turn for his or her presentation.
- Q&A goes after each speaker, the participant can raise hand for questions, and the host will unmute the questioner.
- After Q&A, the host will mute all participants and welcome next speaker.

Warm Tips for Oral Presentation

- Get your presentation PPT files prepared.
- Regular presentation is 20 minutes including 15 minutes of presentation and 5 minutes of Q&A.
- To effectively control the time and avoid some unexpected situations, it is suggested that you should record your presentation ahead of time, do the live oral presentation online or play the video while it's your turn for presentation.

  Step 1: Author records a video introduction with their own image, speaking to the camera, introducing themselves: name, affiliation, brief description of scope of their work

  Step 2: Author then switches to their slides and provides a voiceover describing images in each slide

  Step 3: Authors need to be able to upload these presentations to a location specified by YOU in advance. Send the video to the staff in advance.

Presentation Guideline

Best Presentation Award

- One Best Presentation will be selected from each session, and the result will be announced at the end of the session.

Conference Material

- All presented papers will be issued with soft copy of conference materials: Receipt, Participation and presentation certificate, etc.

Notes

- Log in the meeting room 10 minutes ahead of the session.
- Learn the zoom skills.
- Please kindly keep your Paper ID in mind so that the staff can quickly locate your registration information.
- Your punctual arrival and active involvement in each session will be highly appreciated.
- The conference will be recorded; we will appreciate your proper behavior.

Follow us

- Add the Wechat of CBEES-BBS for more detailed and updated conference news.

Scanning me:

ZOOM User Guideline

Download the ZOOM: https://zoom.us/download

Learn the ZOOM skills

- Please visit: https://support.zoom.us/hc/en-us/articles/201362033-Getting-Started-on-Windows-and-Mac
- GIF guideline: http://amms.org/zoom.html

How to use ZOOM:

- Sign up an account.
- Set the language.
- Test computer or device audio.
- Join a meeting: Join the meeting with "meeting ID" provided in the program, tap the name as "Paper ID-name", eg. " F0007-Freya Shi" or "Lis-Freya Shi", then click "Join".
- Get familiar with the basic functions: Rename, Chat, Raise Hand, Start Video, Share the computer sound and Screen Share, etc.
  The most important function is Share Screen, because you will use it for your online presentation.

On June 21, we will have test session. On that day, we will teach you how to use ZOOM and the functions mentioned above. If you don't know how to use, please do not worry. However, you must download ZOOM, then, you can join the conference.

Program-at-a-Glance

Test Session Schedule			
Date	**Duration**	**Event**	**Meeting ID**
June 21 Sunday	10:00-10:30	**Test Session 1-Topic: "Pure Mathematics"** F0010, F2005, F2028, F2031, F2011	**639-9428-1834**
	10:30-11:00	**Test Session 2-Topic: "Applied Statistics"** F3002-A, F2009, F0005, F0006, F2003	
	11:00-11:30	**Test Session 3-Topic: "Mathematical Modeling"** F0011, F0021, F0019, F0020, F1004	
	11:30-12:00	**Test Session 4-Topic: "Data Mining and Analysis"** F0014, F0015, F2010, F0022, F0018	
	12:00-14:00	Break	
	14:00-14:10	**Keynote Speaker I** Prof. Nikolaos Limnios, University of Technology of Compiegne, France	**639-9428-1834**
	14:10-14:20	**Keynote Speaker II** Prof. Ding-Geng Chen, University of North Carolina-Chapel Hill, USA	
	14:20-14:30	**Keynote Speaker III** Prof. Alexander Bulinski, Moscow State University, Russia	
	14:30-14:40	**Invited Speaker I** Prof. João Tiago Praça Nunes Mexia, Universidade Nova de Lisboa, Portugal	
	14:40-14:50	**Invited Speaker II** Assoc. Prof. Nazrina Aziz, Universiti Utara Malaysia, Malaysia	

Tips: Please log in the meeting room in the specific test session on time. Oral presentation test: 5 minutes/per paper.

Program-at-a-Glance

Formal Session Schedule			
Date	**Duration**	**Event**	**Meeting ID**
June 22 Monday	13:40-14:00	Join in the Meeting Room	**639-9428-1834**
	14:00-14:10	**Opening Remarks** Prof. João Tiago Praça Nunes Mexia, Universidade Nova de Lisboa, Portugal	
	14:10-14:50	**Keynote Speech I** Prof. Nikolaos Limnios, University of Technology of Compiegne, France	
	14:50-15:30	**Keynote Speech II** Prof. Ding-Geng Chen, University of North Carolina-Chapel Hill, USA	
	15:30-15:40	Break	
	15:40-16:20	**Keynote Speech III** Prof. Alexander Bulinski, Moscow State University, Russia	**639-9428-1834**
	16:20-16:40	**Invited Speaker I** Prof. João Tiago Praça Nunes Mexia, Universidade Nova de Lisboa, Portugal	
	16:40-17:00	**Invited Speaker II** Assoc. Prof. Nazrina Aziz, Universiti Utara Malaysia, Malaysia	
	13:40-17:00	**Back up Room for Q&A**	**940-2336-5584**

Formal Session Schedule			
Date	**Duration**	**Event**	**Meeting ID**
June 23 Tuesday	10:00-11:40	**Session 1-Topic: "Pure Mathematics"** F0010, F2005, F2028, F2031, F2011	**639-9428-1834**
		Session 2-Topic: "Applied Statistics" F3002-A, F2009, F0005, F0006, F2003	**940-2336-5584**
	11:40-13:00	Break	
	13:00-14:40	**Session 3-Topic: "Mathematical Modeling"** F0011, F0021, F0019, F0020, F1004	**639-9428-1834**
		Session 4-Topic: "Data Mining and Analysis" F0014, F0015, F2010, F0022, F0018	**940-2336-5584**
	10:00-14:40	**Back up Room for Q&A**	**940-2336-5584**

General Chair

Prof. Jochen Merker
Leipzig University, Germany

Jochen Merker is professor of ”Analysis and Optimization” at the Leipzig University of Applied Sciences since 2015. He received his PhD in Mathematics from the University of Hamburg in 2005. Afterwards he worked as a Postdoc in ”Applied Analysis” at the University of Rostock, received his Habilitation in 2012 and became a professor in Stralsund in 2013, before he became a full professor at HTWK Leipzig. His research focuses on PDEs and functional analysis, particularly functional analytic settings for linear and nonlinear stationary and evolution equations, especially degenerate and singular parabolic PDEs with non-local terms, and on (contact) Hamiltonian systems on manifolds. Regarding this topic, he received in 2018 a honorable mention in the international Ian Snook Prize 2017 for his research article On local Lyapunov exponents of chaotic Hamiltonian systems, CMST 24(2) (2018), 97–111. Since 2019 he is Advisory Editor of the prestigious journal ”Mathematical Methods in the Applied Sciences” (Wiley)

Keynote Speaker I

Prof. Nikolaos Limnios
University of Technology of Compiegne, France

Nikolaos LIMNIOS is Professor of Exceptional class (PhD 1983 and Dr Sciences 1991) at University of Technology of Compiegne at Sorbonne University Alliance and former Director of the Applied Mathematics Lab., in Compiegne. His research interests include: Statistical Inference for Stochastic Processes, Stochastic Processes, Diffusion and Poisson Approximation, Semi-Markov and Hidden semi-Markov Processes, Random Evolutions, Branching Processes, with applications in Reliability, Biostatistics, Seismology, Insurance and Finance. He published about 150 journal papers and 10 monographs. He is an Associated Editor of the journals: Communications in Statistics: Theory and Methods, Communications in Statistics: Simulation and Computation, Methodology and Computing in Applied Probability, Journal of Statistical Theory and Practice, Reliability: Theory and Applications (Electronic journal). He is the Editor-in-Chief of books series "Mathematics and Statistics", iSTE, London, (published with J. Wiley, Elsevier).

Speech Title: "Semi-Markov Chains and Estimation of their Stationary Distribution"

Abstract—Our presentation concerns semi-Markov processes in discrete-time. Semi-Markov chains generalise the Markov chains and renewal processes in discrete-time. These kind of processes are used in many different applications: in biology for the sequences of DNA, RNA, in survival analysis, in earthquake studies, in cracking in mechanics, in information theory, in reliability, etc. One of the main characteristics of these processes is their stationary distribution. We propose an empirical estimator of the stationary distribution based on the evolution of the semi-Markov system in a time interval. Basic properties and estimation problems of stationary distribution function. We will present approximation results in a functional setting and then we will them to obtain estimators properties, as consistency and asymptotic normality.

Keynote Speaker II

ASA Fellow, Prof. Ding-Geng Chen
University of North Carolina-Chapel Hill, USA

Dr. (Din) Ding-Geng Chen is the Wallace H. Kuralt distinguished professor at the School of Social Work and a professor in biostatistics at the Department of Biostatistics at Gillings School of Global Public Health from the University of North Carolina-Chapel Hill, USA. Before this, he was a professor in biostatistics at the University of Rochester Medical Center, the Karl E. Peace endowed eminent scholar chair and professor in biostatistics from the Jiann-Ping Hsu College of Public Health at the Georgia Southern University. Dr. Chen is an elected fellow of American Statistical Association (ASA), an elected member of the International Statistics Institute (ISI) and a senior expert consultant for biopharmaceuticals and government agencies with extensive expertise in clinical trial biostatistics. He has more than 200 professional publications and co-authored/co-edited 30 books on biostatistics clinical trials, biopharmaceutical statistics, interval-censored survival data analysis, meta-analysis, public health statistics, statistical causal inferences, statistical methods in big-data sciences and Monte-Carlo simulation based statistical modeling. He has been invited internationally to speak and give short courses and tutorials at various scientific conferences.

Speech Title: "Data Fusion and Statistical Meta-Analysis in Big-Data Era"

Abstract—Data fusion and statistical meta-analysis is a process of integrating multiple data sources and diverse studies to produce more reliable and efficient conclusion. In this big-data era, it is natural, rather than the exception, that the data collected to address the same/similar scientific question come from diverse sources. The art and science of synthesizing information from diverse sources to draw a more effective inference is generally referred to as systematic reviews and meta-analysis It can be performed by either synthesizing study-level summary statistics (SS) or modeling individual participant-level data (IPD), if available. However, it remains not fully understood whether the use of IPD indeed gains additional efficiency over SS. In this talk, we discuss the relative efficiency of the two methods under a general likelihood inference setting. We show theoretically that there is no gain of efficiency asymptotically by analyzing IPD, provided that the random-effects follow the Gaussian distribution and maximum likelihood estimation is used to obtain summary statistics. Our findings are confirmed by simulation studies and a real data analysis of beta-blocker treatment effect for myocardial infarction. This is a joint work among Drs. Dungang Liu, Xiaoyi Min and Heping Zhang, paper published at Biometrics (Chen, D.G, Liu, D., Min, X. and Zhang H. Relative efficiency of using summary and individual information in random-effects meta-analysis. Biometrics, 2020;1–11. https://doi.org/10.1111/biom.13238).

Keynote Speaker III

Prof. Alexander Bulinski
Moscow State University, Russia

Alexander Bulinski, Professor of the Moscow State University, Dr. Sc. Phys. Math. (Habilitation) is a Member of the Board of the Moscow Mathematical Society since 2000, was a Member of the European Committee of the Bernoulli Society (2002-2006). He is an author of 5 books and numerous research papers. His main results pertain to the theory of stochastic processes and random fields. Various statistical applications of limit theorems are also in the scope of his activity. A.Bulinski belongs to the scientific school of Professor A.N.Kolmogorov being his former PhD student. He was awarded the State Scholarship for prominent scientists and International Science Foundation Diploma ``for outstanding contribution to world science and education". He is a winner of the Lomonosov prize in Science. A.Bulinski is a Member of the Editorial Boards of 6 journals. He was Invited Professor in France, Germany, Sweden, Netherlands, UK etc. Under his scientific direction 15 PhD-theses were written and 4 are in preparation. He was Keynote Speaker and Invited Speaker, as well as a member of Program Committees, at various International conferences. A.Bulinski is a Member of the Expert Council for Higher Qualification Committee of Russia, Head of the Federal Teaching Union on Mathematics and Mechanics in the Higher Education System of Russia.

Speech Title: "Feature Selection Theory and Applications"

Abstract—The talk is devoted to study of stochastic models described by means of some features collection X = (X1; : : : ;Xn) and a response variable Y: Such models are widely used, e.g., inmedicine and biology, where Y can characterize the health state of a patient and X comprises genetic and nongenetic factors. We are interested in models involving high-dimensional observations. A challenging problem is to identify the sub-collection of in uential (in a sense) factors. There are well-known feature selection procedures. Here we mention only few of them: Boolean operation-based screening and testing (BOOST), least absolute shrinkage and selection method (LASSO), adaptive and group LASSO, nonnegative (NN) Garrote, penalized regression with smoothly clipped absolute deviation (SCAD) penalty, least angle regression (LAR) and generalized Dantzig selector (DS). Traditionally feature selection methods are classi ed into lters, wrappers and embedded ones. The hybrid methods are also treated. An important subject is the development of algorithms for structured features (e.g., having group or tree, or graph structure). Usually one assumes that all features are known in advance. However, in certain models the candidate features are generated dynamically, thus the size of features is unknown. Such features are named streaming ones and a streaming feature selection arises. Feature selection methods give a possibility to improve the prediction performance, to reduce the computation time and better understand the structure of the data. This research domain is located at the border of the modern statistics and machine learning. Along with a survey we concentrate on the new results involving various concepts of information theory. Among tools we mention the transfer entropy and the Kull-back - Leibler divergence. Appropriate theorems are provided to describe the asymptotic properties of statistics under consideration. Cross-validation and stability problems (including the choice of di erent stability measures) are in the scope as well. Special attention is paid to applications in bioinformatics, namely, in genome-wide association studies (GWAS). We tackle also the simulation problems related to feature selection.

Invited Speaker I

Prof. João Tiago Praça Nunes Mexia
Universidade Nova de Lisboa, Portugal

Prof. João Tiago Praça Nunes Mexia was born in Lisbon in June of 1939. The most part of his career was as Full Professor at the FCT/UNL-Faculty for Sciences and Technology of the New University of Lisbon. At that time he supervised the teaching of Statistics at FCT/UNL and directed the Research Center in Mathematics of the University (CMA-Center for Mathematics and its Applications) from 1999 to 2009. In 2009 he became Emeritus Professor. Until now he supervised 19 Ph.D. and co-supervised 12 Ph.D. His research is centered on Linear Statistical Inference, having almost 100 papers published in International Journals.

Topic: "Additive Models: Estimation, Prediction and Structured Families"

Abstract—We generalize the classic Scheffe Theorem, that will be applied to normal vectors with covariance matrix $\delta^2 C$; known up to δ^2; independent from S; being S the product by δ^2 of a central chi-square. Namely, C may be not invertible. We obtain confidence ellipsoids and simultaneous confidence in-tervals, through duality. These confidence intervals will be used to "refine" F tests for fixed effects models. The asymptotic version of these results will be obtained using the continuous mapping theorem. Lastly we consider the case of the singular multinomial distribution.

Invited Speaker II

Assoc. Prof. Nazrina Aziz
Universiti Utara Malaysia, Malaysia

Nazrina Aziz is currently Associate Professor of Statistics in the Department of Mathematics and Statistics at the Universiti Utara Malaysia. She has taught a vast range of statistics courses for undergraduate degrees, master's degrees and training courses. Her research interest concerns the investigation of theoretical problems and applications in a variety of areas such as Acceptance Sampling, Satisfaction Survey, Program Evaluation Survey, Disease Mapping and Statistical Modeling in Healthcare. She has involved in developing a few instruments to measure industrial employees' and tertiary education's satisfaction. She has also edited three books, four scopus indexed proceedings and contributed five chapters in different books. Currently, a majority of her postgraduate students are investigating on acceptance sampling. Most of their works have been published in indexing journals and proceedings.

Title: New Group Chain Sampling Plan (NGChSP-1) for Generalized Exponential Distribution

Abstract—Recently, many researchers have developed various acceptance sampling plans to be used by producers in making decision whether to accept or reject inspected lots. In 2015, Mughal, Zain and Aziz proposed group chain sampling plan (GChSP) that solves the issues in chain acceptance sampling plans (ChSP) (time complexity during inspection) and group acceptance sampling plans (GSP) (insecure probability of lot acceptance). GChSP was created based on three acceptance criteria, the first being no defective is recorded in the current lot - without considering the number of defectives found in preceding lot. This contradicts with the condition of having a cumulative of one defective for the current lot to be accepted. Hence, in this article we developed the new group chain sampling plan (NGChSP-1) to handle the issue of acceptance criteria in GChSP. The NGChSP-1 is developed based on truncated life test for generalized exponential distribution. The performance comparison of the NGChSP-1 and GChSP are discussed in the findings.

Detailed Program for Oral Session

Session 1: Pure Mathematics

Time: 10:00-11:40, June 23, 2020 (Tuesday)

Greenwich Mean Time (GMT+02:00) – France Local Time

Meeting ID: 639-9428-1834

Session Chair: Dr. Sandra Ferreira, New University of Lisbon, Portugal

S1-1	F0010 10:00-10:20	Existence of the Solution for the Problem in Subdi usive Medium with a Moving Concentrated Source **Hon-hung Terence Liu** Tatung University, Taiwan *Abstract*—This paper investigates the problem of a fractional differential equation with moving concentrated source in an infinite rod. This fractional differential operator is used to formulate the diffusion problem in a subdiffusive medium. The existence of the solution is established, the finite time blow-up criteria for the solution of the problem is given. The critical speed of the concentrated sources on the behavior of the solution are investigated. keywords. Green's function, fractional diffusion equations, fractional derivatives, moving concentrated source AMS (MOS) Subject Classification. 35R11, 35R12.
S1-2	F2005 10:20-10:40	Metrics for Multi-Set-Theoretic Graphs over Fixed Set of Vertices **Ray-Ming Chen** Baise University, China *Abstract*—In this article, we show how to define distance functions for multiedged graphs, either with vertices being labelled or unlabelled. These metrics are constructed mainly based on the minimal matching for multi-sets. In the end, we implement such metrics based on adjacent matrices. These metrics provide some important applications in the real world.
S1-3	F2028 10:40-11:00	A Note on Integrating Factors of a Conformable Fractional Differential Equation **F. Mart ínez**, I. Mart ínez and S. Paredes Universidad Polit écnica de Cartagena, Spain *Abstract*—Recently exact fractional differential equations have been introduced, using the conformable fractional derivative. In this paper, we propose and prove some new results on the integrating factor. We introduce a conformable version of several classical special cases for which the integrating factor can be determined. Specifically, the cases we will consider are where there is an integrating factor that is a function of only x, or a function of only y, or a simple formula of x and y. In addition, using the Conformable Euler's Theorem on homogeneous functions, an integration factor for the conformable homogeneous differential equations is established. Finally, the above results apply in some interesting examples.
S1-4	F2031 11:00-11:20	A Knot Selection Algorithm for Splines in Logistic Regression **Tzee-Ming Huang** National Chengchi University, Taiwan

		Abstract—In ordinary logistic regression, the logit of the conditional probability of the response given the covariates is modeled as a linear function of the covariates. In this study, a more general logistic regression model is considered, where linearity is not assumed. Since the linear function of the covariates is replaced by a general function of the covariates, spline approximation is used. A knot selection algorithm is proposed to determine the knot locations in spline approximation. Simulation experiments have been carried out to check the performance of the proposed algorithm. The proposed algorithm performs reasonably well.
S1-5	F2011 11:20-11:40	On the Construction of Multivariate correlation Coefficients **Jochen Merker** and Gregor Schuldt Leipzig University of Applied Sciences, Germany *Abstract*—A multivariate (un)correlation coefficient maps a vector-valued random variable $\vec{X} = (X_1, \dots X_N)$ to a real number between 0 and 1, which indicates how linearly (un)correlated its components $X_i, i = 1, \dots, N$, are. In this paper, we provide a unified framework for multivariate (un)correlation coefficients known in literature, and construct new multivariate (un)correlation coefficients using Rényi entropies, which allow applications in many scientific areas.

Detailed Program for Oral Session

Session 2: Applied Statistics

Time: 10:00-11:40, June 23, 2020 (Tuesday)

Greenwich Mean Time (GMT+02:00) – France Local Time

Meeting ID: 940-2336-5584

Session Chair: Assoc. Prof. Nazrina Aziz, Universiti Utara Malaysia, Malaysia

S2-1	F3002-A 10:00-10:20	Auxiliary Information for Improving the Statistical Matching of Income and Consumption **Irene Rioboo** and Friderike Oehler European Commission, Luxembourg *Abstract*—This exercise addresses the joint distribution of income and consumption produced through a statistical matching of the European Statistics on Income and Living Conditions (EU-SILC) and the Household Budget Survey (HBS). The major limitation of the methods generally used in statistical matching is that they are based on the Conditional Independence Assumption (CIA), which is very strict, seldom holds and is difficult to test with the data available. In order to relax or avoid this assumption we test two alternatives. The first option uses as matching variable a proxy of the EU-SILC target variable. The high correlation between those variables allows considering the CIA a plausible hypothesis. The second option avoids the CIA by using a third source where income and consumption are jointly observed: the module on Over-indebtedness, Consumption and Wealth (OWC) of the 2017 EU-SILC wave. This exercise compares both options and their role in improving the estimates provided by the statistical matching.
S2-2	F2009 10:20-10:40	Estimating of Factors Influencing the Brewing Market by Using Decision Trees: A Case of Bulgaria **Hristina Kulina**, Snezhana Gocheva-Ilieva and Atanas Ivanov University of Plovdiv Paisii Hilendarski, Bulgaria *Abstract*—This study examines the influence of key market factors – price, distribution, digital and non-digital advertising, atmospheric temperature and others on the sales of the brewing sector in Bulgaria. The monthly observations over nearly five years are analyzed for a major brand of beer. The data are modeled using the powerful data mining technique of Classification and Regression Trees (CART). The built models describe beer sales in relation to the studied factors with high goodness-of-fit statistics: coefficient of determination up to R^2 = 94% and RMSE = 3.11. Cross-validation and holdout data sampling are used to assess the quality of obtained models. The models are applied for forecasting the volume of beer sales for one month ahead.
S2-3	F0005 10:40-11:00	Assessing the Risk of Cancer Prevalence from Lifestyle Activities among Students I n Bloemfontein, South Africa **G. Makanda**, R. Sypkens and M.S Makanda Central University of Technology, South Africa *Abstract*—The prevalence of cancer and cardiovascular diseases has caused one of the highest death rates in the world. Research has shown

		that lifestyle is the major cause of cancers. Cancerous cells develop due what people eat and how they live their lives. This research investigates the risk of cancer occurrence in Bloemfontein in South Africa. The research was carried out by using a questionnaire developed by CANSA South Africa on this assessment. The questionnaire included various lifestyle questions. The data was then analyzed using SPSS and EvaSys (Automated Evaluation Software). The results show that most people do not eat healthy and thereby having a high risk of developing cancers.
S2-4	F0006 11:00-11:20	Machine Learning Versus Statistical Methods in Demand Planning for Energy-efficient Supply Chains **Lucas Schreiber** and Nikolas Moroff Fraunhofer Institute for Material Flow and Logistics, Germany *Abstract*—The research project "E ²Design" intends to integrate energy efficiency as a planning parameter in the design of production and logistics networks. In order to achieve this objective, models and methods are developed that enable an appropriate approach in the strategic and tactical planning of supply chains. It was observed that models and methods for designing supply chains are always based on accurate demand forecasting. This is equally true for the design of supply chains with the core objective of energy efficiency. The better and more granular the demand forecast can be performed, the more valid recommendations for action can be provided to improve energy efficiency. To accomplish this, this paper aims at identifying promising models for the selection and implementation of a demand forecasting algorithm. By an initial comparison of statistical methods with machine learning methods, high potentials in the context of machine learning will be identified. Subsequently, several process models for implementing a suitable machine learning algorithm to improve forecasting quality are analyzed and the most suitable procedure will be extracted. In order to validate the individual process phases, the importance and presence of the individual phases will be analyzed with the help of a literature research and the need for further research in the area of the development of a standardized procedure will be formulated.
S2-5	F2003 11:20-11:40	Two Inductive Approaches for Exact Wilcoxon Signed-rank Distributions without and with Ties **Ray-Ming Chen** Baise University, China *Abstract*—In this article, we forward two inductive approaches to compute Wilcoxon signed-rank distributions. We take both ties and no-ties into consideration. These methods have merits in easier computation via inductive shifting the distributions. We also give some comparisons between these two approaches.

Break Time: 11:40-13:00

Detailed Program for Oral Session

Session 3: Mathematical Modeling

Time: 13:00-14:40, June 23, 2020 (Tuesday)

Greenwich Mean Time (GMT+02:00) – France Local Time

Meeting ID: 639-9428-1834

Session Chair: Prof. Jochen Merker, HTWK Leipzig, Germany

S3-1	F0011 13:00-13:20	An Age-structured Mathematical Model of Malaria with Heterogenous Mosquito Biting Pattern **Ruijun Zhao** and Sho Kawakami Minnesota State University, USA *Abstract*—An age-structured mathematical model of malaria with heterogeneous mosquito biting pattern is proposed. The force of infection is formulated by a Bayesian formula. An efficient numerical scheme is derived. Numerical simulation was done to simulate the malaria transmission in Nigeria.
S3-2	F0021 13:20-13:40	Mathematical Modelling for Circular Prey-Predator Model **Apurv Agarwal**, Bianchi S. Sangma, Devasri Lal and Surbhi Singh Delhi Technological University, India *Abstract*—The objective of the paper is to explore a unique concept involving cyclical relationships between prey(s) and predator(s) wherein stakeholders in a dynamic ecosystem can harm one another. The paper intends to highlight the possibility of an organism to shoulder both roles- as a prey and a predator with respect to the same organism(s) and environment, hence forming a cyclical relationship between all stakeholders in a given prey-predator ecosystem. The mathematical model hence developed makes use of conventional models, namely the SIR Epidemic Model and Prey Predator Model to show how two different mathematical models can be used together to model a situation in a more realistic way and gain meaningful inferences from it. The above mentioned conventional models have been clubbed together using basic mathematical modelling tools involving compartmental diagrams, differential equation generator, ODE & PDE solver, stability analysis solver, etc. These inferences drawn from the new model give an insight to theoretical results to combat present and future epidemics and maintain a balance in food webs in an ecosystem. The paper presents mathematical models for special cases (i.e. 2-way and 3-way models) and sums up with a general model (i.e. n+1-way model) to form a basis for future research and development. This will enable researchers to deal with more complex and real time issues like pandemic outbreaks, extinction of species, destabilized ecological cycles etc.
S3-3	F0019 13:40-14:00	Comparison of Meso-mechanics and Numerical Simula-tion Based on Particle-reinforced Composites **Shulei Sun** and Wenguo Chen Guizhou Institute of Technology, China *Abstract*—With the macroscopic mechanical properties of the particle reinforced composites, it has been used to approximate theoretical

		solution for a long time. With the development of computer, the comparison of uniaxial tension and simple shear is performed by the meso-mechanical theory and simulation. The simulation model uses the representative volume element (RVE) with periodic boundary conditions. The macroscopic stress and strain of the volume-averaged method use the Mori-Tanaka model and the Double-Inclusion model based on inclusion theory. The results demonstrate that the results with the meso-mechanics are agreement highly with the numerical simulation in the case of the linear elastic deformation. However, the results with the meso-mechanical method have deviation compared to the numerical simulation in the case of finite deformation.
S3-4	F0020 14:00-14:20	Transition Metal Dichacogenide Transmutation Through Neutron Irradiation, Case Study: ZrS2 **Ghaylen Laouini**, Tariq AlZoubi and Mohamed Moustafa American University of the Middle East, China *Abstract*—The transmutation of the ZrS2 Transition Metal Dichalcogenides (TMDC) layered materials through Neutron Irradiation is investigated and discussed. The study is performed by the implementation of the General Monte Carlo N-Particle (MCNP 6) computational tool. A model incorporating the standard linear attenuation coefficient experimental setup has been designed and validated with reported work. The results reveal that, under the neutron interaction rates, the Zr-92, Zr-94 and S-34 are neutron transparent. The results resolve that the ZrS2 TMDC can withstand the neutron radiative environment. Additionally, the (n, alpha) interaction rate showed a threshold of about 2 MeV which is higher than most of the neutron energy spectrum in a thermal nuclear reactor.
S3-5	F1004 14:20-14:40	Nonlinear Measure of EEG Complexity in the Eker Rat Model of Autism Disorder – a Pilot Study **Juliana A. Knocikov á**, Čestmír Vejmola, Ondřej Klovrza and Tomáš Petr ásek National Institute of Mental Health, Czech Republic *Abstract*—Tuberous Sclerosis Complex (TSC) is a severe pathological condition often accompanied by Autism Spectrum Disorder (ASD) and epilepsy. Recently, conclusions resulting from exploration of animal models suggested inhibition of mTOR to be a potential effective treatment. The EEG activity in Tsc2+/- (Eker) rat model has never been explored before. In this pilot study, we performed nonlinear EEG analysis to characterize its significant alterations resulting from treatment based on mTORi (inhibition of mammalian target of rapamycin), as well as from induction of developmental status epilepticus (DSE). Our results based of approximate entropy calculations confirmed that Everolimus (mTOR inhibitor) has a different influence on the regularity of EEG oscillations in wild-type and Tsc2+/- individuals. Moreover, we did not observe any alteration of EEG pattern complexity in adult rats with a history of DSE, and conclude that genotype (Tsc2+/-) and DSE state are probably influenced by different mechanisms of mTORi, with potential for clinical practice.

Detailed Program for Oral Session

Session 4: Data Mining and Analysis

Time: 13:00-14:40, June 23, 2020 (Tuesday)
Greenwich Mean Time (GMT+02:00) – France Local Time
Meeting ID: 940-2336-5584
Session Chair: Assoc. Prof. Vlad Barbu, University of Rouen, France
Assoc. Prof. Tzee-Ming Huang, National Chengchi University, Taiwan

S4-1	F0014 13:00-13:20	A Linear Metric for Multivariate Discrete Finite Data Based on Data-derived Analytical Meshes **Ray-Ming Chen** Baise University, China *Abstract*—In this article, we show how to define a metric on a fixed interval $I \subseteq R$. This metric measures the degree of overlap of two groups of linear data. Then we extend this metric to multivariate discrete data via linearization of the data via the data-based analytical meshes, which is uniquely determined by the given data. We also demonstrate how to apply this metric. This metric is novel and could be applied further in dealing with high-dimension data and could also be used in the real world problems.
S4-2	F2010 13:20-13:40	PM10 Prediction Using CART Method Depending on the Number of Observations **Maya Stoimenova-Minova**, Snezhana Gocheva-Ilieva and Atanas Ivanov University of Plovdiv Paisii Hilendarski, Bulgaria *Abstract*—The main air pollutant all around the world is particulate matter PM10. This is particulate matter smaller than 10 microns. In the human body, harmful particles lead to serious health problems, causing chronic lung disease, asthma, bronchitis, and heart failure. Statistics for Bulgaria show that an average of 66-68% of mortality is due to exactly such cardiovascular disease. This paper applies the powerful Classification and Regression Tree (CART) method to analyze data about PM10 air pollution for the city of Smolyan. The modeling procedure found that depending on the number of observations, the obtained models approximate the actual data to a different degree. The study uses mean daily measurements for the period from 1 January 2010 to 27 April 2018. The obtained results show that the best model approximates the actual measured values of PM10 up to 87%. The selected best CART model is applied to forecast future pollution 3 days ahead.
S4-3	F0015 13:40-14:00	A Unified Proof for Finding a Minimal Spanning Tree **Ray-Ming Chen** Baise University, China *Abstract*—Finding a minimal spanning tree (MST) has attracted a lot of researchers. There are many approaches and ways to find a MST of a network. In this article, we demonstrate a systematic approach based on natural induction over the set of nodes to reach a final MST. The approach

		is to label the given network and find a MST of it by growing trees based on the induction of labelled nodes.
S4-4	F0022 14:00-14:20	Multi-Agent Reinforcement Learning with Clipping Intrinsic Motivation **K. Charoenpitaks** and Y. Limpiyakorn Chulalongkorn University, Thailand *Abstract*—Intrinsic motivation is one of the potential candidates to help improve performance of reinforcement learning algorithm in complex environments. The method enhances exploration capability without explicitly told by the creator. This is suitable for the case of multi-agent reinforcement learning where the environment complexity is beyond standard. In this paper, the Random Network Distillation method is applied to implement intrinsic motivation in the multi-agent environment. Two intrinsic motivation architectures are developed and compared with the benchmark in different scenarios. The experiments show an increase in performance of the very complex environments while little to no improvement over the non-complex ones. Although there exists some overhead which results in less sample efficiency, the centralized intrinsic motivation architecture shows a long-term on par or even better optimization performance as it could explore on more states. The performance of the centralized architecture shows a solid improvement in 2s3z environment and achieve almost 70% win rate over the benchmark of 43%.
S4-5	F0018 14:20-14:40	Estimation of Wheat Supply in Erbil , Irag **Brahim Fezzani** and Bakhytzhan Suleimenov University of Central Asia, Kazakhstan *Abstract*—This paper is about wheat supply response in Kurdistan Region of Iraq. Simple OLS models, Nerlovian partial adjustment approach, is used to yield estimates on wheat production, acreage, and productivity, short-run, long-run elasticities, and growth rates in this region for the period 1990-2018. Production estimates depended on wheat prices, acreage, rainfall level, seed prices, fertilizer, pesticides, fuel prices, labor costs, and a binary variable to consider the effects of war and economic blockade (imposed by the UN). Whilst acreage supply includes lag variables, other remaining variables were included in the production estimates. Finally, productivity of supply contains one lag variable, wheat productivity and the other remainders of variables are identical to the previous models. Statistical analysis indicate that all variables were found significant at $\alpha = 0.10$. Short-run and long-run elasticities of supply were 0.68% and 0.79% respectively. Acreage elasticities in the short run were 0.46% in the short run and 0.84% in the long run. Elasticities for short-run and long run of productivity were 0.24% and 0037% respectively. The coefficient of adjustment for production, acreage and productivity were 0.009%, - 0.02 and 0.03 % respectively. This means that the annual growth rate in production is less than 1%, which is extremely low. The acreage growth rate (-) means that the annual growth indicated a decline. A plausible reason might be linked to a combination of factors, more use of fertilizers and pesticides in the ploughed acreage; rural migration to

		cities because of the war and its aftermath. Finally, annual productivity growth rate indicated a modest gain.